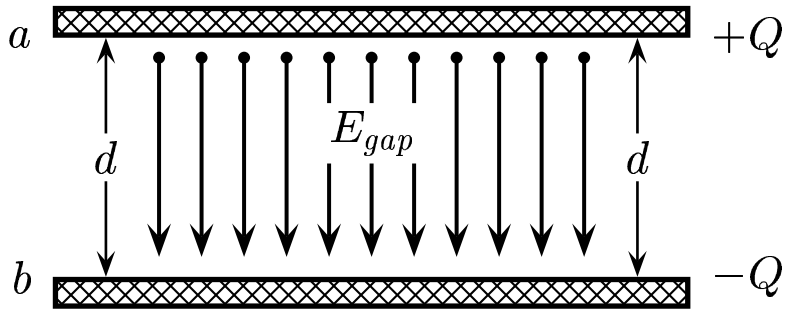
A parallel plate system has a plate charge Q.

Within the gap $E_{\text{gap}} = \dfrac{\sigma_{\text{plate}}}{\epsilon_0} = \dfrac{Q}{\epsilon_0 A}$.

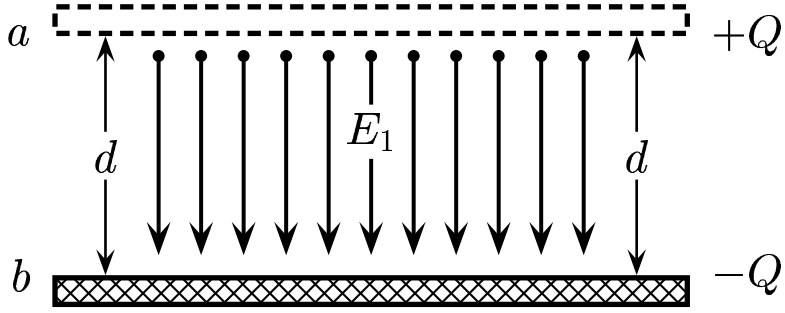


Determine electric force F with which the bottom plate pulls the top plate.

A) $F = Q\,E_{\text{gap}}$

B) $F = \dfrac{1}{2}\,Q\,E_{\text{gap}}$

The electric field due to the bottom plate as shown is



$E_1 = \dfrac{Q_{\text{encl}}}{2\,\epsilon_0\,A} = \dfrac{E_{\text{gap}}}{2}$. This leads to $F = Q\,E_1 = \dfrac{Q\,E_{\text{gap}}}{2}$

Answer **B**.